

The cat *Felis catus* is a domestic species of small carnivorous mammal¹² It is the only domesticated species in the family Felidae and is commonly referred to as the domestic cat or house cat to distinguish it from the wild members of the family⁴ Cats are commonly kept as house pets but can also be farm cats or feral cats the feral cat ranges freely and avoids human contact⁵ Domestic cats are valued by humans for companionship and their ability to kill vermin About 60 cat breeds are recognized by various cat registries⁶ The cat is similar in anatomy to the other felid species it has a strong flexible body quick reflexes sharp teeth and retractable claws adapted to killing small prey like mice and rats Its night vision and sense of smell are well developed Cat communication includes vocalizations like meowing purring trilling hissing growling and grunting as well as cat-specific body language Although the cat is a social species it is a solitary hunter As a predator it is crepuscular ie most active at dawn and dusk It can hear sounds too faint or too high in frequency for human ears such as those made by mice and other small mammals⁷ It also secretes and perceives pheromones⁸ Female domestic cats can have kittens from spring to late autumn in temperate zones and throughout the year in equatorial regions with litter sizes often ranging from two to five kittens^{9,10} Domestic cats are bred and shown at events as registered pedigreed cats a hobby known as cat fancy Population control of cats may be achieved by spaying and neutering but their proliferation and the abandonment of pets has resulted in large numbers of feral cats worldwide contributing to the extinction of entire bird mammal and reptile species¹¹ It was long thought that cat domestication began in ancient Egypt where cats were venerated from around 3100 BC^{12,13} but recent advances in archaeology and genetics have shown that their domestication occurred in the Near East around 7500 BC¹⁴ As of 2021^{update} there were an estimated 220 million owned and 480 million stray cats in the world^{15,16} As of 2017^{update} the domestic cat was the second most popular pet in the United States with 956 million cats owned^{17,18} and around 42 million households owning at least one cat¹⁹ In the United Kingdom 26% of adults have a cat with an estimated population of 10.9 million pet cats as of 2020^{update}²⁰ The origin of the English word cat Old English catt is thought to be the Late Latin word cattus which was first used at the beginning of the 6th century²¹ The Late Latin

word may be derived from an unidentified African language²² The Nubian word kaddiska wildcat and Nobiin kadis are possible sources or cognates²³ The Nubian word may be a loan from Arabic qatt qittcitation needed However it is equally likely that the forms might derive from an ancient Germanic word imported into Latin and thence to Greek and to Syriac and Arabic²⁴ The word may be derived from Germanic and Northern European languages and ultimately be borrowed from Uralic cf Northern Sami gafi female stoat and Hungarian holgy lady female stoat from ProtoUralic kadwa female of a furred animal²⁵ The English puss extended as pussy and pussycat is attested from the 16th century and may have been introduced from Dutch poes or from Low German puuskatte related to Swedish kattepus or Norwegian pus pusekatt Similar forms exist in Lithuanian puize and Irish puisin or puiscin The etymology of this word is unknown but it may have arisen from a sound used to attract a cat²⁶²⁷ A male cat is called a tom or tomcat²⁸ or a gib²⁹ if neutered A female is called a queen³⁰ or a molly³¹^{usergenerated source} if spayed especially in a catbreeding context A juvenile cat is referred to as a kitten In Early Modern English the word kitten was interchangeable with the nowobsolete word catling³² A group of cats can be referred to as a clowder or a glaring³³ The scientific name *Felis catus* was proposed by Carl Linnaeus in 1758 for a domestic cat¹² *Felis catus domesticus* was proposed by Johann Christian Polycarp Erxleben in 1777³ *Felis daemon* proposed by Konstantin Satunin in 1904 was a black cat from the Transcaucasus later identified as a domestic cat³⁴³⁵ In 2003 the International Commission on Zoological Nomenclature ruled that the domestic cat is a distinct species namely *Felis catus*³⁶³⁷In 2007 it was considered a subspecies *F silvestris catus* of the European wildcat *F silvestris* following results of phylogenetic research³⁸³⁹ In 2017 the IUCN Cat Classification Taskforce followed the recommendation of the ICZN in regarding the domestic cat as a distinct species *Felis catus*⁴⁰ The domestic cat is a member of the Felidae a family that had a common ancestor about 1015 million years ago⁴¹The genus *Felis* diverged from other Felidae around 67 million years ago⁴² Results of phylogenetic research confirm that the wild *Felis* species evolved through sympatric or parapatric speciation whereas the domestic cat evolved through artificial selection⁴³ The domesticated cat and its closest wild ancestor are diploid and both

possess 38 chromosomes⁴⁴ and roughly 20000 genes⁴⁵ The leopard cat *Prionailurus bengalensis* was tamed independently in China around 5500 BC This line of partially domesticated cats leaves no trace in the domestic cat populations of today⁴⁶ The earliest known indication for the taming of an African wildcat *F. lybica* was excavated close by a human Neolithic grave in Shillourokambos southern Cyprus dating to about 7500/7200 BC Since there is no evidence of native mammalian fauna on Cyprus the inhabitants of this Neolithic village most likely brought the cat and other wild mammals to the island from the Middle Eastern mainland⁴⁷ Scientists therefore assume that African wildcats were attracted to early human settlements in the Fertile Crescent by rodents in particular the house mouse *Mus musculus* and were tamed by Neolithic farmers This mutual relationship between early farmers and tamed cats lasted thousands of years As agricultural practices spread so did tame and domesticated cats¹⁴⁶ Wildcats of Egypt contributed to the maternal gene pool of the domestic cat at a later time⁴⁸ The earliest known evidence for the occurrence of the domestic cat in Greece dates to around 1200 BC Greek Phoenician Carthaginian and Etruscan traders introduced domestic cats to southern Europe⁴⁹ During the Roman Empire they were introduced to Corsica and Sardinia before the beginning of the 1st millennium⁵⁰ By the 5th century BC they were familiar animals around settlements in Magna Graecia and Etruria⁵¹ By the end of the Western Roman Empire in the 5th century the Egyptian domestic cat lineage had arrived in a Baltic Sea port in northern Germany⁴⁸ During domestication cats have undergone only minor changes in anatomy and behavior and they are still capable of surviving in the wild Several natural behaviors and characteristics of wildcats may have preadapted them for domestication as pets These traits include their small size social nature obvious body language love of play and high intelligence Captive *Leopardus* cats may also display affectionate behavior toward humans but were not domesticated⁵² House cats often mate with feral cats⁵³ Hybridisation between domestic and other Felinae species is also possible producing hybrids such as the Kellas cat in Scotland⁵⁴⁵⁵ Development of cat breeds started in the mid 19th century⁵⁶ An analysis of the domestic cat genome revealed that the ancestral wildcat genome was significantly altered in the process of domestication as specific mutations were selected to develop cat breeds⁵⁷

Most breeds are founded on randombred domestic cats. Genetic diversity of these breeds varies between regions and is lowest in purebred populations which show more than 20 deleterious genetic disorders⁵⁸. The domestic cat has a smaller skull and shorter bones than the European wildcat⁵⁹. It averages about 46 cm (18 in) in head-to-body length and 23–25 cm (9–10 in) in height with about 30 cm (12 in) long tails. Males are larger than females⁶⁰. Adult domestic cats typically weigh between 4 and 5 kg (9 and 11 lb)⁴³. Cats have seven cervical vertebrae as do most mammals, 13 thoracic vertebrae (humans have 12), seven lumbar vertebrae (humans have five), three sacral vertebrae as do most mammals but humans have five, and a variable number of caudal vertebrae in the tail (humans have only three to five vestigial caudal vertebrae fused into an internal coccyx)⁶¹. The extra lumbar and thoracic vertebrae account for the cat's spinal mobility and flexibility. Attached to the spine are 13 ribs, the shoulder and the pelvis⁶¹. Unlike human arms, cat forelimbs are attached to the shoulder by freefloating clavicle bones which allow them to pass their body through any space into which they can fit their head⁶². The cat skull is unusual among mammals in having very large eye sockets and a powerful specialized jaw⁶³. Within the jaw, cats have teeth adapted for killing prey and tearing meat. When it overpowers its prey, a cat delivers a lethal neck bite with its two long canine teeth inserting them between two of the prey's vertebrae and severing its spinal cord, causing irreversible paralysis and death⁶⁴. Compared to other felines, domestic cats have narrowly spaced canine teeth relative to the size of their jaw, which is an adaptation to their preferred prey of small rodents which have small vertebrae⁶⁴. The premolar and first molar together compose the carnassial pair on each side of the mouth, which efficiently shears meat into small pieces like a pair of scissors. These are vital in feeding since cats' small molars cannot chew food effectively and cats are largely incapable of mastication⁶³. Cats tend to have better teeth than most humans, with decay generally less likely because of a thicker protective layer of enamel, a less damaging saliva, less retention of food particles between teeth, and a diet mostly devoid of sugar. Nonetheless, they are subject to occasional tooth loss and infection⁶⁵. Cats have protractible and retractable claws⁶⁶. In their normal relaxed position, the claws are sheathed with the skin and fur around the paws' toe pads. This keeps the claws sharp by

preventing wear from contact with the ground and allows for the silent stalking of prey. The claws on the forefeet are typically sharper than those on the hindfeet.⁶⁷ Cats can voluntarily extend their claws on one or more paws. They may extend their claws in hunting or self-defense, climbing, kneading, or for extra traction on soft surfaces. Cats shed the outside layer of their claw sheaths when scratching rough surfaces.⁶⁸ Most cats have five claws on their front paws and four on their rear paws. The dewclaw is proximal to the other claws. More proximally is a protrusion which appears to be a sixth finger. This special feature of the front paws on the inside of the wrists has no function in normal walking but is thought to be an antiskidding device used while jumping. Some cat breeds are prone to having extra digits, polydactyly.⁶⁹ Polydactylous cats occur along North America's northeast coast and in Great Britain.⁷⁰ The cat is digitigrade. It walks on the toes with the bones of the feet making up the lower part of the visible leg.⁷¹ Unlike most mammals, it uses a pacing gait and moves both legs on one side of the body before the legs on the other side. It registers directly by placing each hind paw close to the track of the corresponding fore paw, minimizing noise and visible tracks. This also provides sure footing for hind paws when navigating rough terrain. As it speeds up from walking to trotting, its gait changes to a diagonal gait. The diagonally opposite hind and fore legs move simultaneously.⁷² Most breeds of cat are notably fond of sitting in high places or perching. A higher place may serve as a concealed site from which to hunt; domestic cats strike prey by pouncing from a perch such as a tree branch. Another possible explanation is that height gives the cat a better observation point, allowing it to survey its territory. A cat falling from heights of up to 3 meters (9.8 ft) can right itself and land on its paws.⁷³ During a fall from a high place, a cat reflexively twists its body and rights itself to land on its feet, using its acute sense of balance and flexibility. This reflex is known as the cat righting reflex.⁷⁴ A cat always rights itself in the same way during a fall if it has enough time to do so, which is the case in falls of 90 cm (2 ft 11 in) or more.⁷⁵ How cats are able to right themselves when falling has been investigated as the falling cat problem.⁷⁶ The cat family, Felidae, can pass down many colors and patterns to their offspring. The domestic cat genes MC1R and ASIP allow for the variety of color in coats. The feline ASIP gene

consists of three coding exons⁷⁷ Three novel microsatellite markers linked to ASIP were isolated from a domestic cat BAC clone containing this gene and were used to perform linkage analysis in a pedigree of 89 domestic cats that segregated for melanism⁷⁸ Cats have excellent night vision and can see at only one-sixth the light level required for human vision^{63, 43} This is partly the result of cat eyes having a tapetum lucidum which reflects any light that passes through the retina back into the eye thereby increasing the eyes sensitivity to dim light⁷⁹ Large pupils are an adaptation to dim light The domestic cat has slit pupils which allow it to focus bright light without chromatic aberration⁸⁰ At low light a cats pupils expand to cover most of the exposed surface of its eyes⁸¹ The domestic cat has rather poor color vision and only two types of cone cells optimized for sensitivity to blue and yellowish green its ability to distinguish between red and green is limited⁸² A response to middle wavelengths from a system other than the rod cells might be due to a third type of cone This appears to be an adaptation to low light levels rather than representing true trichromatic vision⁸³ Cats also have a nictitating membrane allowing them to blink without hindering their vision The domestic cats hearing is most acute in the range of 500 Hz to 32 kHz⁸⁴ It can detect an extremely broad range of frequencies ranging from 55 Hz to 79 kHz whereas humans can only detect frequencies between 20 Hz and 20 kHz It can hear a range of 105 octaves while humans and dogs can hear ranges of about 9 octaves^{85, 86} Its hearing sensitivity is enhanced by its large movable outer ears the pinnae which amplify sounds and help detect the location of a noise It can detect ultrasound which enables it to detect ultrasonic calls made by rodent prey^{87, 88} Recent research has shown that cats have sociospatial cognitive abilities to create mental maps of owners locations based on hearing owners voices⁸⁹ Cats have an acute sense of smell due in part to their well-developed olfactory bulb and a large surface of olfactory mucosa about 58 square centimetres (2932 square inch) in area which is about twice that of humans⁹⁰ Cats and many other animals have a Jacobsons organ in their mouths that is used in the behavioral process of flehmening It allows them to sense certain aromas in a way that humans cannot Cats are sensitive to pheromones such as 3-mercapto-3-methylbutan-1-ol⁹¹ which they use to communicate through urine spraying and marking with

scent glands⁹² Many cats also respond strongly to plants that contain nepetalactone especially catnip as they can detect that substance at less than one part per billion⁹³ About 7080 of cats are affected by nepetalactone⁹⁴ This response is also produced by other plants such as silver vine *Actinidia polygama* and the herb valerian it may be caused by the smell of these plants mimicking a pheromone and stimulating cats social or sexual behaviors⁹⁵ Cats have relatively few taste buds compared to humans 470 or so versus more than 9000 on the human tongue⁹⁶ Domestic and wild cats share a taste receptor gene mutation that keeps their sweet taste buds from binding to sugary molecules leaving them with no ability to taste sweetness⁹⁷ They however possess taste bud receptors specialized for acids amino acids like protein and bitter tastes⁹⁸ Their taste buds possess the receptors needed to detect umami However these receptors contain molecular changes that make the cat taste of umami different from that of humans In humans they detect the amino acids of glutamic acid and aspartic acid but in cats they instead detect nucleotides in this case inosine monophosphate and l-histidine⁹⁹ These nucleotides are particularly enriched in tuna⁹⁹ This has been argued is why cats find tuna so palatable as put by researchers into cat taste the specific combination of the high IMP and free l-histidine contents of tuna produces a strong umami taste synergy that is highly preferred by cats⁹⁹ One of the researchers involved in this research has further claimed I think umami is as important for cats as sweet is for humans¹⁰⁰ Cats also have a distinct temperature preference for their food preferring food with a temperature around 38 C 100 F which is similar to that of a fresh kill and routinely rejecting food presented cold or refrigerated which would signal to the cat that the prey item is long dead and therefore possibly toxic or decomposing⁹⁶ To aid with navigation and sensation cats have dozens of movable whiskers vibrissae over their body especially their faces These provide information on the width of gaps and on the location of objects in the dark both by touching objects directly and by sensing air currents they also trigger protective blink reflexes to protect the eyes from damage^{63 47} Outdoor cats are active both day and night although they tend to be slightly more active at night¹⁰¹ Domestic cats spend the majority of their time in the vicinity of their homes but can range many hundreds of meters from this central point They establish

territories that vary considerably in size in one study ranging from 7 to 28 hectares 1769 acres¹⁰²

The timing of cats activity is quite flexible and varied but being lowlight predators they are generally crepuscular which means they tend to be more active in the morning and evening However house cats behaviour is also influenced by human activity and they may adapt to their owners sleeping patterns to some extent¹⁰³¹⁰⁴ Cats conserve energy by sleeping more than most animals especially as they grow older The daily duration of sleep varies usually between 12 and 16 hours with 13 and 14 being the average Some cats can sleep as much as 20 hours The term cat nap for a short rest refers to the cats tendency to fall asleep lightly for a brief period While asleep cats experience short periods of rapid eye movement sleep often accompanied by muscle twitches which suggests they are dreaming¹⁰⁵ The social behavior of the domestic cat ranges from widely dispersed individuals to feral cat colonies that gather around a food source based on groups of cooperating females¹⁰⁶ Within such groups one cat is usually dominant over the others¹⁰⁷ Each cat in a colony holds a distinct territory with sexually active males having the largest territories which are about 10 times larger than those of female cats and may overlap with several females territories These territories are marked by urine spraying by rubbing objects at head height with secretions from facial glands and by defecation⁹² Between these territories are neutral areas where cats watch and greet one another without territorial conflicts Outside these neutral areas territory holders usually chase away stranger cats at first by staring hissing and growling and if that does not work by short but noisy and violent attacks Despite this colonial organization cats do not have a social survival strategy or a pack mentality and always hunt alone¹⁰⁸ Life in proximity to humans and other domestic animals has led to a symbiotic social adaptation in cats and cats may express great affection toward humans or other animals Ethologically a cats human keeper functions as if a mother surrogate¹⁰⁹ Adult cats live their lives in a kind of extended kittenhood a form of behavioral neoteny Their highpitched sounds may mimic the cries of a hungry human infant making them particularly difficult for humans to ignore¹¹⁰ Some pet cats are poorly socialized In particular older cats show aggressiveness toward newly arrived kittens which include biting and scratching this

type of behavior is known as feline asocial aggression¹¹¹ Redirected aggression is a common form of aggression which can occur in multiple cat households In redirected aggression there is usually something that agitates the cat this could be a sight sound or another source of stimuli which causes a heightened level of anxiety or arousal If the cat cannot attack the stimuli it may direct anger elsewhere by attacking or directing aggression to the nearest cat dog human or other being¹¹²¹¹³ Domestic cats scent rubbing behavior toward humans or other cats is thought to be a feline means for social bonding¹¹⁴ Domestic cats use many vocalizations for communication including purring trilling hissing growlingsnarling grunting and several different forms of meowing⁷ Their body language including position of ears and tail relaxation of the whole body and kneading of the paws are all indicators of mood The tail and ears are particularly important social signal mechanisms in cats A raised tail indicates a friendly greeting and flattened ears indicate hostility Tailraising also indicates the cats position in the groups social hierarchy with dominant individuals raising their tails less often than subordinate ones¹¹⁵ Feral cats are generally silent¹¹⁶ 208 Nasetonose touching is also a common greeting and may be followed by social grooming which is solicited by one of the cats raising and tilting its head¹⁰⁶ Purring may have developed as an evolutionary advantage as a signaling mechanism of reassurance between mother cats and nursing kittens who are thought to use it as a caresoliciting signal¹¹⁷ Postnursing cats also often purr as a sign of contentment when being petted becoming relaxed¹¹⁸¹¹⁹ or eating Even though purring is popularly interpreted as indicative of pleasure it has been recorded in a wide variety of circumstances most of which involve physical contact between the cat and another presumably trusted individual¹¹⁷ Some cats have been observed to purr continuously when chronically ill or in apparent pain¹²⁰ The exact mechanism by which cats purr has long been elusive but it has been proposed that purring is generated via a series of sudden buildups and releases of pressure as the glottis is opened and closed which causes the vocal folds to separate forcefully The laryngeal muscles in control of the glottis are thought to be driven by a neural oscillator which generates a cycle of contraction and release every 3040 milliseconds giving a frequency of 33 to 25 Hz¹¹⁷¹²¹¹²² Cats are

known for spending considerable amounts of time licking their coats to keep them clean¹²³¹²⁴ The cat's tongue has backward-facing spines about 500 μ m long which are called papillae. These contain keratin which makes them rigid¹²⁵ so the papillae act like a hairbrush. Some cats, particularly long-haired cats, occasionally regurgitate hairballs of fur that have collected in their stomachs from grooming. These clumps of fur are usually sausage-shaped and about 2.3 cm ³⁴¹¹⁴ in long. Hairballs can be prevented with remedies that ease elimination of the hair through the gut as well as regular grooming of the coat with a comb or stiff brush¹²³. Among domestic cats, males are more likely to fight than females¹²⁶. Among feral cats, the most common reason for cat fighting is competition between two males to mate with a female. In such cases, most fights are won by the heavier male¹²⁷. Another common reason for fighting in domestic cats is the difficulty of establishing territories within a small home¹²⁶. Female cats also fight over territory or to defend their kittens. Neutering will decrease or eliminate this behavior in many cases, suggesting that the behavior is linked to sex hormones¹²⁸. When cats become aggressive, they try to make themselves appear larger and more threatening by raising their fur, arching their backs, turning sideways, and hissing or spitting¹²⁹. Often the ears are pointed down and back to avoid damage to the inner ear and potentially listen for any changes behind them while focused forward. Cats may also vocalize loudly and bare their teeth in an effort to further intimidate their opponents. Fights usually consist of grappling and delivering powerful slaps to the face and body with the forepaws as well as bites. Cats also throw themselves to the ground in a defensive posture to rake their opponents' belly with their powerful hind legs¹³⁰. Serious damage is rare as the fights are usually short in duration with the loser running away with little more than a few scratches to the face and ears. Fights for mating rights are typically more severe and injuries may include deep puncture wounds and lacerations. Normally, serious injuries from fighting are limited to infections of scratches and bites, though these can occasionally kill cats if untreated. In addition, bites are probably the main route of transmission of feline immunodeficiency virus¹³¹. Sexually active males are usually involved in many fights during their lives and often have decidedly battered faces with obvious scars and cuts to their ears and nose¹³². Cats are willing to

threaten animals larger than them to defend their territory such as dogs and foxes¹³³ The shape and structure of cats cheeks is insufficient to allow them to take in liquids using suction Therefore when drinking they lap with the tongue to draw liquid upward into their mouths Lapping at a rate of four times a second the cat touches the smooth tip of its tongue to the surface of the water and quickly retracts it like a corkscrew drawing water upward¹³⁴¹³⁵ Feral cats and freefed house cats consume several small meals in a day The frequency and size of meals varies between individuals They select food based on its temperature smell and texture they dislike chilled foods and respond most strongly to moist foods rich in amino acids which are similar to meat Cats reject novel flavors a response termed neophobia and learn quickly to avoid foods that have tasted unpleasant in the past¹⁰⁸¹³⁶ It is also a common misconception that cats like milkcream as they tend to avoid sweet food and milk Most adult cats are lactose intolerant the sugar in milk is not easily digested and may cause soft stools or diarrhea¹³⁷ Some also develop odd eating habits and like to eat or chew on things like wool plastic cables paper string aluminum foil or even coal This condition pica can threaten their health depending on the amount and toxicity of the items eaten¹³⁸ Cats hunt small prey primarily birds and rodents¹³⁹ and are often used as a form of pest control¹⁴⁰¹⁴¹ Cats use two hunting strategies either stalking prey actively or waiting in ambush until an animal comes close enough to be captured¹⁴² The strategy used depends on the prey species in the area with cats waiting in ambush outside burrows but tending to actively stalk birds¹⁴³ ¹⁵³ Domestic cats are a major predator of wildlife in the United States killing an estimated 13 to 40 billion birds and 63 to 223 billion mammals annually¹⁴⁴ Certain species appear more susceptible than others in one English village for example 30 of house sparrow mortality was linked to the domestic cat¹⁴⁵ In the recovery of ringed robins *Erithacus rubecula* and dunnocks *Prunella modularis* in Britain 31 of deaths were a result of cat predation¹⁴⁶ In parts of North America the presence of larger carnivores such as coyotes which prey on cats and other small predators reduces the effect of predation by cats and other small predators such as opossums and raccoons on bird numbers and variety¹⁴⁷ Perhaps the bestknown element of cats hunting behavior which is commonly misunderstood and often appalls cat

owners because it looks like torture is that cats often appear to play with prey by releasing and recapturing it. This cat and mouse behavior is due to an instinctive imperative to ensure that the prey is weak enough to be killed without endangering the cat.¹⁴⁸ Another poorly understood element of cat hunting behavior is the presentation of prey to human guardians. One explanation is that cats adopt humans into their social group and share excess kill with others in the group according to the dominance hierarchy in which humans are reacted to as if they are at or near the top.¹⁴⁹ Another explanation is that they attempt to teach their guardians to hunt or to help their human as if feeding an elderly cat or an inept kitten.¹⁵⁰ This hypothesis is inconsistent with the fact that male cats also bring home prey despite males having negligible involvement in raising kittens.^{143 153} Domestic cats especially young kittens are known for their love of play. This behavior mimics hunting and is important in helping kittens learn to stalk, capture and kill prey.¹⁵¹ Cats also engage in play fighting with each other and with humans. This behavior may be a way for cats to practice the skills needed for real combat and might also reduce any fear they associate with launching attacks on other animals.¹⁵² Cats also tend to play with toys more when they are hungry.¹⁵³ Owing to the close similarity between play and hunting, cats prefer to play with objects that resemble prey such as small furry toys that move rapidly but rapidly lose interest. They become habituated to a toy they have played with before.¹⁵⁴ String is often used as a toy but if it is eaten it can become caught at the base of the cat's tongue and then move into the intestines, a medical emergency which can cause serious illness even death.¹⁵⁵ Owing to the risks posed by cats eating string it is sometimes replaced with a laser pointer's dot which cats may chase.¹⁵⁶ Female cats called queens are polyestrous with several estrus cycles during a year lasting usually 21 days. They are usually ready to mate between early February and August¹⁵⁷ in northern temperate zones and throughout the year in equatorial regions.¹⁰ Several males called tomcats are attracted to a female in heat. They fight over her and the victor wins the right to mate. At first the female rejects the male but eventually the female allows the male to mate. The female utters a loud yowl as the male pulls out of her because a male cat's penis has a band of about 120¹⁵⁰ backward-pointing penile spines which are about 1 mm.¹³²

in long upon withdrawal of the penis the spines may provide the female with increased sexual stimulation which acts to induce ovulation¹⁵⁸ After mating the female cleans her vulva thoroughly If a male attempts to mate with her at this point the female attacks him After about 20 to 30 minutes once the female is finished grooming the cycle will repeat¹⁵⁹ Because ovulation is not always triggered by a single mating females may not be impregnated by the first male with which they mate¹⁶⁰ Furthermore cats are superfecund that is a female may mate with more than one male when she is in heat with the result that different kittens in a litter may have different fathers¹⁵⁹ The morula forms 124 hours after conception At 148 hours early blastocysts form At 1012 days implantation occurs¹⁶¹ The gestation of queens lasts between 64 and 67 days with an average of 65 days¹⁵⁷¹⁶² Data on the reproductive capacity of more than 2300 freeranging queens were collected during a study between May 1998 and October 2000 They had one to six kittens per litter with an average of three kittens They produced a mean of 14 litters per year but a maximum of three litters in a year Of 169 kittens 127 died before they were six months old due to a trauma caused in most cases by dog attacks and road accidents⁹ The first litter is usually smaller than subsequent litters Kittens are weaned between six and seven weeks of age Queens normally reach sexual maturity at 510 months and males at 57 months This varies depending on breed¹⁵⁹ Kittens reach puberty at the age of 910 months¹⁵⁷ Cats are ready to go to new homes at about 12 weeks of age when they are ready to leave their mother¹⁶³ They can be surgically sterilized spayed or castrated as early as seven weeks to limit unwanted reproduction¹⁶⁴ This surgery also prevents undesirable sexrelated behavior such as aggression territory marking spraying urine in males and yowling calling in females Traditionally this surgery was performed at around six to nine months of age but it is increasingly being performed before puberty at about three to six months¹⁶⁵ In the United States about 80 of household cats are neutered¹⁶⁶ The average lifespan of pet cats has risen in recent decades In the early 1980s it was about seven years^{167 33 168} rising to 94 years in 1995^{167 33} and about 15 years in 2021^{citation needed} Some cats have been reported as surviving into their 30s¹⁶⁹ with the oldest known cat Creme Puff dying at a verified age of 38¹⁷⁰ Neutering increases life expectancy one study

found castrated male cats live twice as long as intact males while spayed female cats live 62 longer than intact females^{167 35} Having a cat neutered confers health benefits because castrated males cannot develop testicular cancer spayed females cannot develop uterine or ovarian cancer and both have a reduced risk of mammary cancer¹⁷¹ About 250 heritable genetic disorders have been identified in cats many similar to human inborn errors of metabolism¹⁷² The high level of similarity among the metabolism of mammals allows many of these feline diseases to be diagnosed using genetic tests that were originally developed for use in humans as well as the use of cats as animal models in the study of the human diseases^{173 174} Diseases affecting domestic cats include acute infections parasitic infestations injuries and chronic diseases such as kidney disease thyroid disease and arthritis Vaccinations are available for many infectious diseases as are treatments to eliminate parasites such as worms ticks and fleas¹⁷⁵ The domestic cat is a cosmopolitan species and occurs across much of the world⁵⁸ It is adaptable and now present on all continents except Antarctica and on 118 of the 131 main groups of islands even on the isolated Kerguelen Islands^{176 177} Due to its ability to thrive in almost any terrestrial habitat it is among the worlds most invasive species¹⁷⁸ It lives on small islands with no human inhabitants¹⁷⁹ Feral cats can live in forests grasslands tundra coastal areas agricultural land scrublands urban areas and wetlands¹⁸⁰ The unwantedness that leads to the domestic cat being treated as an invasive species is twofold On one hand as it is little altered from the wildcat it can readily interbreed with the wildcat This hybridization poses a danger to the genetic distinctiveness of some wildcat populations particularly in Scotland and Hungary possibly also the Iberian Peninsula and where protected natural areas are close to humandominated landscapes such as Kruger National Park in South Africa^{181 155} On the other hand and perhaps more obviously its introduction to places where no native felines are present contributes to the decline of native species¹⁸² Feral cats are domestic cats that were born in or have reverted to a wild state They are unfamiliar with and wary of humans and roam freely in urban and rural areas¹¹ The numbers of feral cats is not known but estimates of the United States feral population range from 25 to 60 million¹¹ Feral cats may live alone but most are found in large colonies which occupy a specific territory and

are usually associated with a source of food¹⁸³ Famous feral cat colonies are found in Rome around the Colosseum and Forum Romanum with cats at some of these sites being fed and given medical attention by volunteers¹⁸⁴ Public attitudes toward feral cats vary widely from seeing them as freeranging pets to regarding them as vermin¹⁸⁵ Some feral cats can be successfully socialized and retamed for adoption young cats especially kittens¹⁸⁶ and cats that have had prior experience and contact with humans are the most receptive to these efforts On islands birds can contribute as much as 60 of a cats diet¹⁸⁷ In nearly all cases the cat cannot be identified as the sole cause for reducing the numbers of island birds and in some instances eradication of cats has caused a mesopredator release effect¹⁸⁸ where the suppression of top carnivores creates an abundance of smaller predators that cause a severe decline in their shared prey Domestic cats are a contributing factor to the decline of many species a factor that has ultimately led in some cases to extinction The South Island piopio Chatham rail¹⁴⁶ and the New Zealand merganser¹⁸⁹ are a few from a long list with the most extreme case being the flightless Lyalls wren which was driven to extinction only a few years after its discovery¹⁹⁰¹⁹¹ One feral cat in New Zealand killed 102 New Zealand lesser shorttailed bats in seven days¹⁹² In the US feral and freeranging domestic cats kill an estimated 63 223 billion mammals annually¹⁴⁴ In Australia the impact of cats on mammal populations is even greater than the impact of habitat loss¹⁹³ More than one million reptiles are killed by feral cats each day representing 258 species¹⁹⁴ Cats have contributed to the extinction of the Navassa curlytailed lizard and Chioninia coctei¹⁸² Cats are common pets throughout the world and their worldwide population as of 2007 exceeded 500 million¹⁹⁵ Cats have been used for millennia to control rodents notably around grain stores and aboard ships and both uses extend to the present day¹⁹⁶¹⁹⁷ As well as being kept as pets cats are also used in the international fur trade¹⁹⁸ and leather industries for making coats hats blankets stuffed toys¹⁹⁹ shoes gloves and musical instruments²⁰⁰ About 24 cats are needed to make a catfur coat²⁰¹ This use has been outlawed in the United States since 2000 and in the European Union as well as the United Kingdom since 2007²⁰² Cat pelts have been used for superstitious purposes as part of the practice of witchcraft²⁰³ and are still made into

blankets in Switzerland as traditional medicine thought to cure rheumatism²⁰⁴ A few attempts to build a cat census have been made over the years both through associations or national and international organizations such as that of the Canadian Federation of Humane Societies²⁰⁵ and over the Internet²⁰⁶²⁰⁷ but such a task does not seem simple to achieve General estimates for the global population of domestic cats range widely from anywhere between 200 million to 600 million²⁰⁸²⁰⁹²¹⁰²¹¹²¹² Walter Chandoha made his career photographing cats after his 1949 images of Loco an especially charming stray taken in were published around the world He is reported to have photographed 90000 cats during his career and maintained an archive of 225000 images that he drew from for publications during his lifetime²¹³ A cat show is a judged event in which the owners of cats compete to win titles in various catregistering organizations by entering their cats to be judged after a breed standard²¹⁴ It is often required that a cat must be healthy and vaccinated in order to participate in a cat show²¹⁴ Both pedigreed and nonpurebred companion moggy cats are admissible although the rules differ depending on the organization Competing cats are compared to the applicable breed standard and assessed for temperament²¹⁴ Cats can be infected or infested with viruses bacteria fungus protozoans arthropods or worms that can transmit diseases to humans²¹⁵ In some cases the cat exhibits no symptoms of the disease²¹⁶ The same disease can then become evident in a human²¹⁷ The likelihood that a person will become diseased depends on the age and immune status of the person Humans who have cats living in their home or in close association are more likely to become infected Others might also acquire infections from cat feces and parasites exiting the cats body²¹⁵²¹⁸ Some of the infections of most concern include salmonella catscratch disease and toxoplasmosis²¹⁶ In ancient Egypt cats were worshipped and the goddess Bastet often depicted in cat form sometimes taking on the warlike aspect of a lioness The Greek historian Herodotus reported that killing a cat was forbidden and when a household cat died the entire family mourned and shaved their eyebrows Families took their dead cats to the sacred city of Bubastis where they were embalmed and buried in sacred repositories Herodotus expressed astonishment at the domestic cats in Egypt because he had only ever seen wildcats²¹⁹ Ancient Greeks and Romans kept weasels as pets which were seen as

the ideal rodentkillers The earliest unmistakable evidence of the Greeks having domestic cats comes from two coins from Magna Graecia dating to the midfifth century BC showing Iokastos and Phalanthos the legendary founders of Rhegion and Taras respectively playing with their pet cats The usual ancient Greek word for cat was ailouros meaning thing with the waving tail Cats are rarely mentioned in ancient Greek literature Aristotle remarked in his History of Animals that female cats are naturally lecherous The Greeks later syncretized their own goddess Artemis with the Egyptian goddess Bastet adopting Bastets associations with cats and ascribing them to Artemis In Ovids Metamorphoses when the deities flee to Egypt and take animal forms the goddess Diana turns into a cat²²⁰²²¹ Cats eventually displaced weasels as the pest control of choice because they were more pleasant to have around the house and were more enthusiastic hunters of mice During the Middle Ages many of Artemiss associations with cats were grafted onto the Virgin Mary Cats are often shown in icons of Annunciation and of the Holy Family and according to Italian folklore on the same night that Mary gave birth to Jesus a cat in Bethlehem gave birth to a kitten²²² Domestic cats were spread throughout much of the rest of the world during the Age of Discovery as ships cats were carried on sailing ships to control shipboard rodents and as goodluck charms⁴⁹ Several ancient religions believed cats are exalted souls companions or guides for humans that are allknowing but mute so they cannot influence decisions made by humans In Japan the maneki neko cat is a symbol of good fortune²²³ In Norse mythology Freyja the goddess of love beauty and fertility is depicted as riding a chariot drawn by cats²²⁴ In Jewish legend the first cat was living in the house of the first man Adam as a pet that got rid of mice The cat was once partnering with the first dog before the latter broke an oath they had made which resulted in enmity between the descendants of these two animals It is also written that neither cats nor foxes are represented in the water while every other animal has an incarnation species in the water²²⁵ Although no species are sacred in Islam cats are revered by Muslims Some Western writers have stated Muhammad had a favorite cat Muezza²²⁶ He is reported to have loved cats so much he would do without his cloak rather than disturb one that was sleeping on it²²⁷ The story has no origin in early Muslim writers and seems to confuse a story of a later Sufi

saint Ahmed arRifai centuries after Muhammad²²⁸ One of the companions of Muhammad was known as A Hurayrah father of the kitten in reference to his documented affection to cats²²⁹ The ancient Egyptians mummified dead cats out of respect in the same way that they mummified people⁴ Ancient Roman mosaic of a cat killing a partridge from the House of the Faun in Pompeii A 19th century drawing of a tabby cat Some cultures are superstitious about black cats ascribing either good or bad luck to them Many cultures have negative superstitions about cats An example would be the belief that encountering a black cat crossing ones path leads to bad luck or that cats are witches familiars used to augment a witchs powers and skills The killing of cats in Medieval Ypres Belgium is commemorated in the innocuous presentday Kattenstoet cat parade²³⁰ In mid 16th century France cats would be burnt alive as a form of entertainment particularly during midsummer festivals According to Norman Davies the assembled people shrieked with laughter as the animals howling with pain were singed roasted and finally carbonized²³¹ The remaining ashes were sometimes taken back home by the people for good luck²³² According to a myth in many cultures cats have multiple lives In many countries they are believed to have nine lives but in Italy Germany Greece Brazil and some Spanish speaking regions they are said to have seven lives²³³²³⁴ while in Arabic traditions the number of lives is six²³⁵ An early mention of the myth can be found in John Heywoods The Proverbs of John Heywood 1546²³⁶ Husband quoth she ye studie be merrie now And even as ye thinke now so come to yow Nay not so quoth he for my thought to tell right I thinke how you lay groning wife all last night Husband a groning horse and a groning wife Never faile their master quoth she for my life No wife a woman hath nine lives like a cat The myth is attributed to the natural suppleness and swiftness cats exhibit to escape lifethreatening situations²³⁷ Also lending credence to this myth is the fact that falling cats often land on their feet using an instinctive righting reflex to twist their bodies around Nonetheless cats can still be injured or killed by a high fall²³⁸